

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFAg | Central Chilterns

Data appendix (AQ-001-009)

Air quality

November 2013

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Department
for Transport

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High Speed Two (HS2) Limited,
Eland House,
Bressenden Place,
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

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1 Introduction

1.1.1 The air quality appendix for the Central Chilterns community forum area (CFA 9) comprises:

- discussion of the policy framework (Section 2);
- baseline air quality data (Section 3);
- dust impact evaluation and risk rating (Section 4); and
- air quality assessment - road traffic (Section 5).

1.1.2 Maps referred to throughout the air quality appendix are contained in the Volume 5, Air Quality Map Book.

2 Policy framework

- 2.1.1 Policy CS₄ of the Chiltern Core Strategy¹ contains specific measures to minimise impacts on designated local air quality management areas (AQMA). Saved Policies GC₃ and GC₉ of the Chiltern Local Plan² seek to achieve good standards of amenity and prevent unacceptable levels of air pollution from new development.

¹ Chiltern District Council, (2011), *Core Strategy for Chiltern District 2011*.

² Chiltern District Council, (1997), *Chiltern District Local Plan 1997*.

3 Baseline air quality data

3.1 Existing air quality

Local authority review and assessment information

3.1.1 Chiltern District Council carries out monitoring across its area. The Council's review and assessment process has identified that the district meets air quality standards in the majority of areas, although traffic has caused an increase in levels of pollutants in some areas. In 2007, Chiltern District Council designated an AQMA along Berkhamstead Road/ Broad Street (A416) in Chesham due to exceedances of nitrogen dioxide (NO₂) at kerbside monitoring locations. This area lies more than 4km from the proposed route, is outside the study area and will not be affected by changes in traffic from the Proposed Scheme.

3.1.2 From local authority information, baseline concentrations of NO₂ and particulate matter as PM₁₀ and PM_{2.5} in the study area are well within air quality standards which are as follows:

Local air quality monitoring data

Pollutant concentrations can be compared to the air quality standards:

- 40µg/m³ as an annual mean for NO₂ and PM₁₀;
- 200µg/m³ one-hour mean for NO₂ not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
- 50µg/m³ 24-hour mean for PM₁₀ not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
- 25µg/m³ as an annual mean for PM_{2.5}.

3.1.3 There are no monitors within the study area that are relevant to this assessment.

Background pollutant concentrations

3.1.4 Estimates of background air quality have been taken from the Department for Environment, Food and Rural Affairs (Defra) maps³. Background NO₂ annual mean concentrations are estimated to have been in the range 10.4µg/m³ - 12.1µg/m³ in 2012, well within the air quality standard of 40µg/m³. Background PM₁₀ concentrations are within air quality standards throughout the study area, with PM₁₀ annual mean concentrations in the range 14.6µg/m³ - 15.7µg/m³ in 2012.

Local emission sources

3.1.5 The main source of pollution in the Central Chilterns area is road vehicles. Major roads include the A4128, A413 and the B485.

³ Defra; Background Pollutant Concentration Maps; <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>; Accessed: July 2013.

3.2 Receptors

Human

Construction phase

- 3.2.1 Potential receptors are primarily those residential properties close to construction activity and alongside roads where traffic flows will change as a consequence of construction activity. Notable receptors in relation to construction activity include properties at Pipers Wood Cottages, Park View Cottages, Mantle's Farm, Chapel Farm, Sheepcotts Cottage, Mantle's Green Cottage, Orchard Cottage, Frith Hill Farm, Cudsdens Court and Brambles. Notable receptors near roads where traffic flows will change are Kings Pond Cottage and 59 Kings Lane. Receptors at greatest risk of dust effects are indicated in Maps AQ-02-009-01 and AQ-02-009-02 (Volume 5, Air Quality Map Book).
- 3.2.2 There are no sensitive horticultural receptors in CFA9. Four traditional orchards identified are considered not to be particularly sensitive to dust and are therefore not subject to specific consideration.

Operational phase

- 3.2.3 Once the Proposed Scheme is operational, only receptors located on roads where possible increases in operational traffic or where the road alignment will change by more than 5m have the potential to be affected. Notable receptors include King's Pond Cottage.

Ecological

Construction phase

- 3.2.4 No ecological receptors are predicted to be affected by air quality as a result of the construction phase of the Proposed Scheme.

Operational phase

- 3.2.5 No ecological receptors in the area are predicted to be affected by air quality as a result of the operational phase.

4 Dust impact evaluation and risk rating

- 4.1.1 The following sections provide details of the assessment of construction impacts following the Institute of Air Quality Management (IAQM) guidance⁴. Where considered useful to identify receptors and their relationship to the construction activity, a specific figure is provided. On-site haul movements were assessed explicitly.
- 4.1.2 The dust assessment criteria for the haul route are based on those for earthworks, as set out in the IAQM guidance. This emission phase was considered to be the most applicable, as the assessment of impacts from earthworks will depend, in part, on the passage of vehicles over open surfaces. It was assumed that significant effects would not occur beyond a distance of 50m from the haul route, again based on interpretation of the earthworks criteria, and that all areas of the haul route will be subject to more than 10 vehicle movements per day. On the basis of criteria for earthworks within the IAQM guidance, the dust emission class for the haul route is large. Wherever there are receptors within 50m of a haul route, the sensitivity of the receiving environment was derived using the IAQM guidance. The need for, and capability of, the local environmental management plan (LEMP) to control these dust emissions, as directed by the draft Code of Construction Practice⁵ (CoCP), was then considered in forming the conclusion of the assessment.

Table 1: Evaluation and risk rating of construction activities

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Little Missenden vent shaft - Pipers Wood Cottages and Park View Cottages (Map AQ-02-009-01, Figure 9.1 (Volume 5, Air Quality Map Book))						
Demolition	N/A	N/A	N/A	N/A	N/A	No demolitions are required.
Earthworks	100-200m	Medium	Low	Low	Negligible	1. Total site area 2,500m ² - 10,000m ² . 2. No receptors within 20m of the site.
Construction	100-200m	Medium	Low	Low	Negligible	1. Use of dusty construction materials.

⁴ Institute of Air Quality Management (IAQM), (2011), *Guidance on the assessment of the impacts of construction on air quality and the determination of their significance*.

⁵ Volume 5: Appendix CT-003-000.

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						2. No receptors within 20m of the site.
Trackout	Greater than 100m	N/A	N/A	N/A	N/A	1. No receptors within 100m of the road.
Haul route	N/A	N/A	N/A	N/A	N/A	No trace movements associated with the site.
Chiltern Tunnel north portal - Mantle's Farm and Mantles Green Cottage (Map AQ-02-009-01, Figure 9.2 and Figure 9.3 (Volume 5, Air Quality Map Book))						
Demolition	N/A	N/A	N/A	N/A	N/A	No demolitions are required.
Earthworks	50-100m	Large	Medium	Low	Negligible	1. Greater than 10,000m ² . 2. No receptors within 20m of the site.
Construction	200-350m	Large	Low	Low	Negligible	1. Use of dusty construction materials. 2. No receptors within 20m of the site.
Trackout	Less than 20m	Medium	Medium	Medium	Negligible	1. Fewer than 100 heavy goods vehicles (HGVs) on road. 2. Fewer than 10 receptors within 20m of the site.
Haul route	Less than 50m	Large	High	Medium	Negligible	1. More than 10 HGV movements per day. 2. Fewer than 10 receptors within 50m of haul route.

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Chiltern Tunnel northern approach cutting - Chapel Farm and Sheepcotts Cottage (Map AQ-02-009-01, Figure 9.4 (Volume 5, Air Quality Map Book))						
Demolition	20-100m	Medium	Medium	Low	Negligible	1. Potentially dusty construction material. 2. No receptors within 20m of the demolition.
Earthworks	Less than 20m	Large	High	Medium	Negligible	1. Total site area greater than 10,000m ² . 2. Fewer than 10 receptors within 20m of the site.
Construction	Less than 20m	Large	High	Medium	Negligible	1. Use of dusty construction materials. 2. Fewer than 10 receptors within 20m of the site.
Trackout	Less than 20m	Large	High	Medium	Negligible	1. More than 100 HGVs on road. 2. Fewer than 10 receptors within 20m of the site.
Haul route	Less than 50m	Large	High	Medium	Negligible	1. More than 10 HGV movements per day. 2. Fewer than 10 receptors within 50m of haul route.
South Heath green tunnel - Cudsdens Court, Frith Hill and Orchard Cottage (Map AQ-02-009-02, Figure 9.5 and Figure 9.6 (Volume 5, Air Quality Map Book))						
Demolition	Less than 20m	Medium	High	Medium	Negligible	1. Potentially dusty construction material. 2. Fewer than 10 receptors within 20m of

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						the site.
Earthworks	Less than 20m	Large	High	Medium	Negligible	1. Total site area greater than 10,000m ² . 2. Fewer than 10 receptors within 20m of the site.
Construction	Less than 20m	Large	High	Medium	Negligible	1. Use of dusty construction materials. 2. Fewer than 10 receptors within 20m of the site.
Trackout	Less than 20m	Medium	Medium	Medium	Negligible	1. Fewer than 100 HGVs on road. 2. Fewer than 10 receptors within 20m of the site.
Haul route	Less than 50m	Large	High	Medium	Negligible	1. More than 10 HGV movements per day. 2. Fewer than 10 receptors within 50m of haul route.
South Heath cutting - Brambles (Map AQ-02-009-02, Figure 9.7 (Volume 5, Air Quality Map Book))						
Demolition	20-100m	Medium	Medium	Low	Negligible	1. Potentially dusty construction material. 2. No receptors within 20m of the site.
Earthworks	100-200m	Large	Medium	Low	Negligible	1. Total site area greater than 10,000m ² . 2. No receptors within 20m of the site.

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Construction	100-200m	Large	Medium	Low	Negligible	1. Use of dusty construction materials. 2. No receptors within 100m of the site.
Trackout	Less than 20m	Medium	Medium	Medium	Negligible	1. Fewer than 100 HGVs per day. 2. Fewer than 10 receptors within 20m of the site.
Haul route	N/A	N/A	N/A	N/A	N/A	No receptors within 50m of the haul route.

Table 2: Summary of construction dust impacts and effects

Location	Magnitude of impact (with draft CoCP mitigation measures)	Effect of dust-generating activities	Additional mitigation
Little Missenden vent shaft	Negligible	Not significant	None required
Chiltern Tunnel north portal	Negligible	Not significant	None required
Chiltern Tunnel northern approach cutting	Negligible	Not significant	None required
South Heath green tunnel	Negligible	Not significant	None required
South Heath cutting	Negligible	Not significant	None required

5 Air quality assessment - road traffic

5.1 Overall assessment approach

- 5.1.1 The air quality assessment for road-related emissions has considered the possible use of different approaches based on the scale of changes in traffic and road alignment. Where the Design Manual for Roads and Bridges⁶ (DMRB) thresholds detailed in the Scoping and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) are not exceeded, no additional assessment is required as the air quality impacts will be minimal. Where these thresholds are breached, then a quantitative assessment has been carried out.
- 5.1.2 Where the road configuration is straightforward and the air quality within standards, the DMRB screening method has been used to predict changes in air quality. Professional judgment has been used to select the appropriate tool for each area.
- 5.1.3 In this study area the DMRB screening method was considered to be a suitable tool for the quantitative assessment.

5.2 Construction traffic model

- 5.2.1 Roads assessed for construction traffic, and associated traffic data, are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were based on maximum traffic flows on affected roads during the construction phase of the Proposed Scheme, even though some of these may be for shorter durations than one year.

⁶ Highways Agency (2007), *The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 1 Air Quality HA207/07)*

Receptors assessed

- 5.2.2 The additional traffic and the need for road diversions have the potential to change air quality for some receptors. During the construction phase, all road links identified for assessment will experience increases in traffic numbers. Where DMRB criteria for undertaking a local air quality assessment were met, a number of receptors representative of worst-case exposure locations were selected for assessment. These included locations representative of highest concentrations along the roads, including closest to junctions or to the road itself. Receptors assessed are presented in Table 3 and in Map AQ-01-009 (Volume 5, Air Quality Map Book).

Table 3: Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey coordinates
9-1	King's Pond Cottage (B485 Chesham Road (east of King's Lane))	491400, 201136
9-2	59 King's Lane (King's Lane (south of Frith Hill))	491034, 201477

Background concentrations

- 5.2.3 The background concentrations used in the assessment are shown in Table 4 taken from the Defra maps.

Table 4: Background 2017 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations ($\mu\text{g}/\text{m}^3$)		
	NO _x	NO ₂	PM ₁₀
9-1 King's Pond Cottage	13.0	9.0	14.5
9-2 59 King's Lane	13.0	9.0	14.5

Design Manual for Roads and Bridges model results

- 5.2.4 This section provides the summary of the modelled pollutant concentrations for the assessed receptors using the DMRB methodology. The magnitude of change and impact descriptor for the two human receptors identified are derived following the Environmental Protection UK (EPUK) methodology⁷.

Table 5: Summary of DMRB annual mean NO₂ results (construction phase)

Receptor	Concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
9-1	12.6	10.9	11.6	0.7	Small increase	Negligible
9-2	11.4	9.7	10.3	0.6	Small increase	Negligible

Table 6: Summary of DMRB annual mean PM₁₀ results (construction phase)

Receptor	Concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme			
9-1	15.7	15.0	15.1	0.1	Imperceptible increase	Negligible
9-2	15.4	14.6	14.8	0.2	Imperceptible increase	Negligible

⁷ Environmental Protection UK (EPUK) (2010), *Development Control: Planning for Air Quality* (EPUK 2010)

Assessment of significance

- 5.2.5 The overall magnitude of impact of the Proposed Scheme is negligible at worst for NO₂ and PM₁₀ during construction. Pollutant concentrations will remain well within air quality standards with and without the Proposed Scheme. AQMAs lie outside the study area.
- 5.2.6 The changes in air quality at worst-case receptors during the construction phase will not cause significant effects for receptors since the adverse impact is negligible, taking into account background air quality and air quality standards.

5.3 Operational traffic model

- 5.3.1 Operational traffic data on which this assessment is based is detailed in Volume 5: Appendix TR-001-000. Traffic data assessed relate to a realignment of the B485. Scenarios assessed were based on maximum traffic on affected roads during the operational phase of the Proposed Scheme.

Receptors assessed

- 5.3.2 For the B485 Chesham road realignment, where DMRB criteria for local air quality assessment were met, a receptor representative of worst-case exposure locations was selected for assessment. This is a location representative of highest concentrations along the road, including being closest to junctions or to the road itself. The receptor assessed is presented in Map AQ-01-009 (Volume 5, Air Quality Map Book).

Table 7: Modelled receptors (operational phase)

Receptor	Description/location	Ordnance Survey coordinates
9-3	King's Pond Cottage	491400, 201136

Background concentrations

- 5.3.3 The background concentrations used in the assessment are shown in Table 8 taken from the Defra maps.

Table 8: Background 2026 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations ($\mu\text{g}/\text{m}^3$)		
	NO _x	NO ₂	PM ₁₀
9-3 King's Pond Cottage	10.2	7.2	13.9

Design Manual for Roads and Bridges model results

5.3.4 This section provides the summary of the modelled pollutant concentrations for the assessed receptor. The magnitude of change and impact descriptor are derived following the EPUK methodology⁸.

Table 9: Summary of DMRB annual mean NO₂ results (operational phase)

Receptor	Concentrations (µg/m ³)		Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2026 without Proposed Scheme	2026 with Proposed Scheme			
9-3	9.1	7.4	-1.7	Small decrease	Negligible

Table 10: Summary of DMRB annual mean PM₁₀ results (operational phase)

Receptor	Concentrations (µg/m ³)		Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2026 without Proposed Scheme	2026 with Proposed Scheme			
9-3	14.3	13.9	-0.4	Small decrease	Negligible

⁸ Environmental Protection UK (EPUK), (2010), *Development Control: Planning for Air Quality*.

Assessment of significance

- 5.3.5 The impact of the Proposed Scheme is negligible at worst for NO₂ and PM₁₀ during the operational phase. Pollutant concentrations will remain well within air quality standards with and without the Proposed Scheme. AQMAs lie outside the study area.
- 5.3.6 The changes in air quality at worst-case receptors during the operational phase will not cause significant effects for receptors since the beneficial impact is negligible, taking into account background air quality and air quality standards.

6 References

Chiltern District Council, (2011), *Core Strategy for Chiltern District*.

Chiltern District Council, (1997), *Chiltern District Local Plan*.

Department for Environment, Food and Rural Affairs (Defra), (2010), *Defra background maps 2010*; <http://laqm.defra.gov.uk/maps/maps2010.html> ; Accessed: July 2013.

Environmental Protection UK (EPUK), (2010), *Development Control: Planning for Air Quality*.

Highways Agency, (2007), *The Design Manual for Roads and Bridges* (Volume 11, Section 3, Part 1 Air Quality HA207/07).

Institute of Air Quality Management (IAQM), (2011), *Guidance on the assessment of the impacts of construction on air quality and the determination of their significance*.